

CLAIMS

What is claimed is:

1. Apparatus for enabling group communications in a wireless
5 communications system that includes a first communications unit, a second communications unit, and at least a third communications unit, said apparatus comprising:
 - a receiving device for receiving a first individual encoded voice signal
10 from a first communications unit over a first inbound wireless communications resource, said first encoded signal being a function of a first original voice signal, receiving a second individual encoded voice signal from a second communications unit over a second inbound wireless communications resource, said second encoded signal being a function of a second original voice signal, and receiving at least a third individual encoded voice signal from a third
15 communications unit over a third inbound wireless communications resource, said third encoded signal being a function of a third original voice signal;
 - a processing device adapted for performing an algorithm for generating at least one combined voice signal that is a function of said first, second and third original voice signals, and generating at least one combined encoded voice signal
20 from said at least one combined voice signal; and
 - a transmitting device for transmitting said at least one combined encoded voice signal to said first, second and third communications units over corresponding outbound wireless communications resources.

2. The apparatus of Claim 1, wherein said processing unit is further adapted for performing an algorithm for generating:
- a first representation of an approximation of said first original voice signal;
 - 5 a second representation of an approximation of said second original voice signal; and
 - a third representation of an approximation of said third original voice signal, and wherein said at least one combined voice signal is a function of at least a portion of said first, second and third representations.
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3. The apparatus of Claim 2, wherein said processing unit comprises a first, second and third voice coder and wherein said first representation is generated in said first voice coder, said second representation is generated in said second voice coder, and said third representation is generated in said third voice coder.
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4. The apparatus of Claim 2, wherein said first, second and third representations are pulse code modulated representations of said corresponding first, second and third original voice signals.
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5. The apparatus of Claim 2, wherein said processing unit is further adapted for performing an algorithm for selecting the representations to be included in each said combined voice signals based on whether the representation has a corresponding speech activity level that exceeds a first threshold.
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6. The apparatus of Claim 5, wherein said first threshold is predetermined.
7. The apparatus of Claim 5, wherein said first threshold is dynamically determined based on at least one factor.

8. The apparatus of Claim 2, wherein said processing unit is further adapted for performing an algorithm for generating:
- a first combined encoded voice signal that is exclusive of said first representation, to be transmitted to said first communications unit;
 - 5 a second combined encoded voice signal that is exclusive of said second representation, to be transmitted to said second communications unit; and
 - a third combined encoded voice signal that is exclusive of said third representation, to be transmitted to said third communications unit.
- 10 9. The apparatus of Claim 1, wherein said apparatus is included in a repeater.
10. The apparatus of Claim 1, wherein said processing unit is a digital signal processor.
- 15 11. The apparatus of Claim 1, wherein said wireless communications system is a Time Division Multiple Access ("TDMA") system and wherein:
- said first individual encoded voice signal is received in a first inbound time slot over a first frequency;
 - said second individual encoded voice signal is received in a second
 - 20 inbound time slot over said first frequency;
 - said third individual encoded voice signal is received in a third inbound time slot over said first frequency; and
 - said at least one combined encoded voice signal is transmitted to said first, second and third communications units in a set of corresponding separate
 - 25 outbound time slots over a second frequency.
12. The apparatus of Claim 11, wherein, said TDMA system is a four-slot TDMA system.

13. The apparatus of Claim 1, wherein said wireless communications system is a Frequency Division Multiple Access ("FDMA") system and wherein:

said first individual encoded voice signal is received over a first inbound frequency;

5 said second individual encoded voice signal is received over a second inbound frequency;

said third individual encoded voice signal is received over a second inbound frequency; and

10 said at least one combined encoded voice signal is transmitted to said first, second and third communications units over a set of corresponding separate outbound frequencies.

14. The apparatus of Claim 1, wherein said wireless communications system is a Code Division Multiple Access ("CDMA") system and wherein:

15 said first individual encoded voice signal is received in a first orthogonal spreading code over an inbound frequency;

said second individual encoded voice signal is received in a second orthogonal spreading code over said inbound frequency;

20 said third individual encoded voice signal is received in a third orthogonal spreading code over said inbound frequency; and

said at least one combined encoded voice signal is transmitted to said first, second and third communications units in a set of corresponding orthogonal spreading codes over an outbound frequency.

15. Apparatus for enabling group communications in a wireless communications system that includes a first communications unit, a second communications unit, and at least a third communications unit, said apparatus comprising:

5 a receiving device for receiving a first individual encoded voice signal from a first communications unit over a first wireless communications resource, said first encoded signal being a function of a first original voice signal, receiving a second individual encoded voice signal from a second communications unit over a second wireless communications resource, said second encoded signal being a
10 function of a second original voice signal, and receiving at least a third individual encoded voice signal from a third communications unit over a third wireless communications resource, said third encoded signal being a function of a third original voice signal;

a processing device adapted for performing an algorithm for generating a
15 first representation of an approximation of said first original voice signal, generating a second representation of an approximation of said second original voice signal, generating a third representation of an approximation of said third original voice signal, selecting the representations to be included in at least one combined voice signal based on whether the representation has a corresponding
20 speech activity level that exceeds a first threshold, generating said at least one combined voice signal as a function of at least a portion of said first, second and third representations, and generating at least one combined encoded voice signal from said at least one combined voice signal; and

a transmitting means for transmitting said at least one combined encoded
25 voice signal to said first, second and third communications units over corresponding outbound communications resources.

16. Apparatus for enabling group communications in a TDMA wireless communications system that includes a first communications unit, a second communications unit, and at least a third communications unit, said apparatus comprising:

- 5 a receiving device for receiving a first individual encoded voice signal from a first communications unit in a first inbound time slot over a first frequency, said first encoded signal being a function of a first original voice signal, receiving a second individual encoded voice signal from a second communications unit in a second inbound time slot over said first frequency, said
10 second encoded signal being a function of a second original voice signal, and receiving at least a third individual encoded voice signal from a third communications unit in a third inbound time slot over said first frequency, said third encoded signal being a function of a third original voice signal;
- a processing device adapted for performing an algorithm for generating a
15 first representation of an approximation of said first original voice signal, generating a second representation of an approximation of said second original voice signal, generating a third representation of an approximation of said third original voice signal, selecting the representations to be included in at least one combined voice signal, that is a function of at least a portion of said first, second
20 and third representations, based on whether the representation has a corresponding speech activity level that exceeds a first threshold, generating a first combined voice signal that is exclusive of said first representation, generating a second combined voice signal that is exclusive of said second representation, generating a third combined voice signal that is exclusive of said third representation, and
25 generating a first, second and third combined encoded voice signal from said first second and third combined voice signals; and
- a transmitting means for transmitting said first, second and third combined encoded voice signals, respectively, to said first, second and third communications units in corresponding outbound time slots over a second
30 frequency.

17. A method for enabling group communications in a wireless communications system that includes a first communications unit, a second communications unit, and at least a third communications unit, said method

5 comprising the steps of:

receiving a first individual encoded voice signal from a first communications unit over a first inbound wireless communications resource, said first encoded signal being a function of a first original voice signal;

receiving a second individual encoded voice signal from a second

10 communications unit over a second inbound wireless communications resource, said second encoded signal being a function of a second original voice signal;

receiving at least a third individual encoded voice signal from a third communications unit over a third inbound wireless communications resource, said third encoded signal being a function of a third original voice signal;

15 generating at least one combined voice signal that is a function of said first, second and third original voice signals;

generating at least one combined encoded voice signal from said at least one combined voice signal; and

transmitting said at least one combined encoded voice signal to said first,

20 second and third communications units over corresponding outbound wireless communications resources.

18. The method of Claim 17, wherein said wireless communications system is a Time Division Multiple Access ("TDMA") system and wherein:
said first individual encoded voice signal is received in a first inbound time slot over a first frequency;
5 said second individual encoded voice signal is received in a second inbound time slot over said first frequency;
said third individual encoded voice signal is received in a third inbound time slot over said first frequency; and
said at least one combined encoded voice signal is transmitted to said first,
10 second and third communications units in a set of corresponding separate outbound time slots over a second frequency.

19. The method of Claim 17, wherein said wireless communications system is a Frequency Division Multiple Access ("FDMA") system and wherein:
15 said first individual encoded voice signal is received over a first inbound frequency;
said second individual encoded voice signal is received over a second inbound frequency;
said third individual encoded voice signal is received over a second
20 inbound frequency; and
said at least one combined encoded voice signal is transmitted to said first, second and third communications units over a set of corresponding separate outbound frequencies.

20. The apparatus of Claim 17, wherein said wireless communications system is a Code Division Multiple Access (“CDMA”) system and wherein:

said first individual encoded voice signal is received in a first orthogonal spreading code over an inbound frequency;

5 said second individual encoded voice signal is received in a second orthogonal spreading code over said inbound frequency;

said third individual encoded voice signal is received in a third orthogonal spreading code over said inbound frequency; and

10 said at least one combined encoded voice signal is transmitted to said first, second and third communications units in a set of corresponding orthogonal spreading codes over an outbound frequency.

21. The method of Claim 17 further comprising the steps of:

15 generating a first representation of an approximation of said first original voice signal;

generating a second representation of an approximation of said second original voice signal; and

20 generating a third representation of an approximation of said third original voice signal, and wherein said at least one combined voice signal is a function of at least a portion of said first, second and third representations.

22. The method of Claim 21, wherein said first, second and third representations are pulse code modulated representations of said corresponding first, second and third original voice signals.

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23. The method of Claim 21 further comprising the step of selecting the representations to be included in each said combined voice signals based on whether the representation has a corresponding speech activity level that exceeds a first threshold.

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24. The method of Claim 23, wherein said first threshold is predetermined.
25. The method of Claim 23, wherein said first threshold is dynamically determined based on at least one factor.